Claims:

1. A megasonic cleaning apparatus comprising:

a container for holding a cleaning fluid and a plurality of semiconductor wafer, said container having a rectangular configuration with a floor, four wall, and an open top;

a megasonic transducer array mounted to the floor of the container, said array comprising a frame for holding one or more transducers, each transducer comprising a piezoelectric element bonded to transmitting plate for coupling megasonic energy from the piezoelectric elements into the cleaning fluid;

one or more electrical cables connected to the piezoelectric elements and extending from the element to a source of electrical energy wherein said quartz plates, piezoelectric elements and said connections to the cables all encapsulated in a material that resists intrusion from liquid in the container.

2. The megasonic cleaning apparatus of claim 1 wherein the encapsulating material comprises silicone.

3. The megasonic cleaning apparatus of claim 1 wherein the megasonic transducers comprise a piezoelectric element bonded to a odd quarter wave length quartz plate, said odd quarter wave length quartz plate having first and second planar surfaces separated from each other by the thickness of the quartz plate, said first planar surface facing the floor of the tank for coupling sonic energy from the transducers into the cleaning fluid in the tank and the second planar surfaces bonded to the piezoelectric element.

4. The megasonic cleaning apparatus of claim 1 wherein the transducers are parallel to each other.

5. The megasonic cleaning apparatus of claim 1wherein the transducers are in line with each other.

6. A megasonic cleaning apparatus comprising:

a container for holding a cleaning fluid and a plurality of semiconductor wafer, said container having a rectangular configuration with a floor, four wall, and an open top;

a megasonic transducer array mounted to the floor of the container, said array comprising a frame for holding two or more transducers, said transducers arranged in parallel and aligned transverse to the intended direction of the wafers,

each transducer comprising a piezoelectric element bonded to a odd quarter wave length quartz plate, said odd quarter wave length quartz plate having first and second planar surfaces separated from each other by the thickness of the quartz plate, said first planar surface facing the floor of the tank for coupling sonic energy from the transducers into the cleaning fluid in the tank and the second planar surfaces bonded to the piezoelectric element; and

one or more electrical cables connected to the piezoelectric elements and extending from the element to a source of electrical energy.

7 The megasonic cleaning apparatus of claim 6 wherein said quartz plates, piezoelectric elements and said connections to the cables all encapsulated in a material that resists intrusion from liquid in the container.

8. The megasonic cleaning apparatus of claim 7 wherein the encapsulating material comprises silicone.

9. The megasonic cleaning apparatus of claim 6 wherein the transducer array further comprises a rectangular frame for supporting the quarter wave plates and the piezoelectric elements.

10. The megasonic cleaning apparatus of claim 6 further comprising an odd quarter wave plate coupled to the surface of the transducers and having a thickness that is an odd quarter wave length of sound waves transmitted by the transducers.

11. The megasonic cleaning apparatus of claim 6 further comprising a megasonic generator for generating megasonic electrical signals, an odd quarter wave plate coupled to the surface of the transducers and having a thickness that is an odd quarter wave length of selected megasonic waves transmitted by the transducers, and means for adjusting the megasonic generator to generate electrical signals that correspond to the selected sound waves.

12. The megasonic cleaning apparatus of claim 6 further comprising a class D amplifier and a matching transformer for generating electrical signals that are matched to electro-sonic characteristics of the transducers for generating megasonic sound waves in the cleaning fluid.

13. A method for megasonic cleaning semiconductor wafers comprising the steps of:

generating two or more parallel sets of megasonic waves in a cleaning fluid;

immersing semiconductors in the cleaning fluid;

moving the wafers in the cleaning fluid along a path transverse to the megasonic waves and traversing said path two or more times.

14. The method of claim 13 wherein the megasonic waves are generated across parallel regions of the fluid and the step of moving the wafers comprises reciprocating the wafers through said parallel regions.

15. A method for megasonic cleaning semiconductor wafers comprising the steps of:

generating megasonic waves with a laminar energy wave front in a cleaning fluid in a container; and

intercepting the generated waves inside the container and dispersing the waves in a divergent manner.

16. A megasonic cleaning apparatus comprising:

a container for holding a cleaning fluid and a plurality of semiconductor wafer, said container having a rectangular configuration with a floor, four wall, and an open top;

a megasonic transducer array mounted to the floor of the container, said array comprising a frame for holding one or more transducers, each transducer comprising a piezoelectric element bonded to transmitting plate for coupling megasonic energy from the piezoelectric elements into the cleaning fluid;

a cylindrical rod disposed in the container above the transducers for intercepting laminar sonic energy transmitted from the transducers in a regular pattern and re-distributing said sonic

energy to the rest of the container in a divergent pattern;

one or more electrical cables connected to the piezoelectric elements and extending from the element to a source of electrical energy.

17. The megasonic cleaning apparatus of claim 16 wherein the transmitting plates, piezoelectric elements and said connections to the cables all encapsulated in a material that resists intrusion from liquid in the container.

18. The megasonic cleaning apparatus of claim 16 wherein the encapsulating material comprises silicone.

19. The megasonic cleaning apparatus of claim 16 wherein the transmitting plates comprises quartz plates having a thickness corresponding to an odd quarter wave length of the megasonic energy.

20. A megasonic cleaning apparatus comprising:

a container for holding a cleaning fluid and a plurality of semiconductor wafer, said container having a rectangular configuration with a floor, four wall, and an open top;

a megasonic transducer array mounted to the floor of the container, said array comprising a frame for holding one or more transducers, each transducer comprising a piezoelectric element bonded to transmitting plate for coupling megasonic energy from the piezoelectric elements into the cleaning fluid and an electrical cable connected to the piezoelectric elements;

each transmitting plate comprising a quartz plates having a thickness corresponding to an odd quarter wave length of the megasonic waves generated by the piezoelectric elements.

21. The megasonic cleaning apparatus of claim 20 wherein the transmitting plates, piezoelectric elements and said connections to the cables all are encapsulated in a material that resists intrusion from liquid in the container.

22. The megasonic cleaning apparatus of claim 20 wherein the encapsulating material comprises silicone.

23. An apparatus for generating ozonated water comprising:

a housing for holding fluid and having first and second inlets;

a first inlet for receiving water;

an ozone dispersion filter connected to the second inlet and disposed in the container for dispersing ozone into the water in the container; and

an outlet coupled to the container for removing ozonated water from the container.

24. The apparatus of claim 23 wherein the filter comprises polytetrafluroethylene.

25. A method for generating ozonated water comprising the steps of;

pumping deionized water into a sealed housing;

pumping ozone into a filter in the housing at a pressure greater than the pressure of the water;

withdrawing ozonate water from the housing through a restricted orifice in order to maintain the pressure in the housing for dissolving the ozone into the water in an amount equal to or greater than 7 parts per million.

26. The method of claim 25 wherein the temperature of the water is approximately 20 degrees centigrade $\pm$ two degrees centigrade.